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Review of CalRHIO Proposal
CalPERS

MERCER

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Executive Summary

Background

At the November 2007 Health Benefits Committee meeting, representatives from California Regional Health Information Organization (CalRHIO) made a presentation on their organization and its plans. CalRHIO is a non-profit organization that partners with two technology firms: Medicity and Perot Systems that is in the process of developing a statewide Health Information Exchange (HIE) system to facilitate the secure sharing of available patient clinical information across the California health care system. When completed, such a system could allow the real-time availability of patient clinical information across providers when and where patient's access care, so that clinical errors and/or redundant testing, often caused by a lack of information, can be avoided. CalRHIO would like CalPERS support for the system to encourage health plan and provider participation, in order to speed its development efforts.

Members of the Committee expressed interest in the CalRHIO concept and its potential to improve outcomes in the health care system and asked Staff to conduct further research and analysis on CalRHIO and report its findings at the February HBC meeting. Staff engaged Mercer to assist in conducting a study of CalRHIO. Over the course of January, Mercer has conducted analysis focused on answering three key questions:

- What is the likely financial impact on CalPERS of a successful CalRHIO system (what fixed costs is CalPERS likely to incur over time from CalRHIO user fees, and what type of return can CalPERS reasonably expect from reduced future claims expenses)?
- Is the proposed CalRHIO technology platform likely to function effectively and securely, serve its intended clinical audience appropriately, and scale successfully as its reach is expanded across the entire health care system in the State?

- Do the CalRHIO business model and financing plans offer a reasonable probability for success in its development plans?

Research Methodology

Overview

CalRHIO exists in a unique setting and use case with respect to other Regional Health Information Organization (RHIO) efforts attempted to date. In comparison to other RHIO efforts attempted so far, its proposed scale is beyond compare. CalRHIO is so much larger, would comprise so many more data providers, and would require such an incredibly diverse set of healthcare entities (from payers down to patients) that it almost exists in a class by itself. This creates a challenge when comparing CalRHIO to other efforts. Mercer extracted lessons and data from other RHIO examples and examined them in relation to the CalRHIO effort.

Literature

Overall, there exists a dearth of articles and studies analyzing RHIOs. This is due, in part, to the lack of success that has met many RHIO efforts and therefore the general lack of RHIOs from which to pull output data. Mercer utilized articles that were supplied by CalRHIO concerning the value propositions of healthcare information technology efforts across the country. Additionally, Mercer supplemented these articles with several, very recent research papers on RHIOs and usage of healthcare in California.

Interviews

Mercer interviewed several key potential stakeholders for the CalRHIO process, including representatives from the payer community: Blue Shield of California, Blue Cross of California and Kaiser Permanente; members from the laboratory community: LabCorp; other RHIOs: Delaware Health Information Network; and key technology partner: Medicity. Notes and information gathered from these interviews have been broken down and inserted in relevant positions in this study.

Summary of Key Findings

The following material provides a high-level summary of the key findings from our research, grouped into the 3 main areas we evaluated; Financial Impact, Technology Platform and Development Plan. At the end of the section, we provide our conclusions from our analysis.

Financial Impact

- The theoretical return on investment (ROI) from RHIOs is pretty well documented by a variety of literature sources, though the fact patterns vary for each RHIO
- Since the RHIO movement is still in its infancy, much of the ROI literature is still conceptual in nature and related to the ultimate expected returns, rather than actual results that have already been produced
- The potential ROI during the early stages of RHIO development is much less clear
- Given CalRHIO's current phase of development, we would not expect CalPERS to see any transaction fees charged to it until sometime in 2009, at the earliest
- We estimate that CalPERS annual fees will ultimately run approximately $8 million, once the first phase of the system is fully-developed and operating, 2-3 years from now (pending no change in transaction fee structure)
- Based on our review of the literature, and the CalRHIO development plans, if CalRHIO is successful, CalPERS should realize at least a 5/1 ultimate return on the proposed fees, in the form of reduced claims costs
- We expect this ROI will ramp-up over a period of several years before reaching this ultimate level

Technology Platform

- CalRHIO has contracted with two very credible technology partners: Medicity and Perot Systems, to develop and maintain the system -- both of whom have solid reputations and prior experience with healthcare IT development efforts
- In two Medicity reference calls, Medicity received positive remarks regarding its capability to integrate its product
- The planned system architecture and operating plans appear sound and seem to have effectively addressed key issues, such as security, scalability, interoperability (the ability to connect and draw data from a variety of different host operating systems) and reliability
- When completed, the system will be very complex and dependent on a huge number of local systems for data feeds, so the ultimate reliability of this type of system is still uncertain
- Importantly, the system appears to have the ability to count key data points needed to properly track rules related to chargeability of transactions
- Overall, the technical plan and solution proposed by CalRHIO and Medicity appears to be sensible and sound, relative to its developmental and operational objectives

Development Plan

- CalRHIO has adopted a phased approach to funding and development of the system involving the following key steps:
  - Use grant funding to cover costs of business plan development and start-up activities
  - Obtain fee and data agreements from at least 3 key health plans in order to trigger initial development funding and activity
  - Initial system development to allow access to administrative claims data (with plans to try to incorporate Lab values and Rx detail, as well)
  - Charge data access fees to payers to cover continued system development and maintenance costs (initial focus is on Emergency departments, with physician offices following in time)
  - Add connections to local and regional clinical data feeds from provider community electronic medical records to enhance the value of available data
- They are currently still in the pre-funding (not inclusive of the early developmental grants received) and pre-development phase of their effort and have not yet begun what is planned to be a 7-year build-out of the system
- CalRHIO attracted early grant funding from a number of major players on the CA health care scene, including; Sutter Health, Blue Shield, Wellpoint and California HealthCare Foundation (CHCF)
- The CalRHIO business/funding model appears sensible and low risk from its perspective (system development, and resulting costs, will not begin until they have signed fee and data agreements with at least 3 health plans (which triggers added funding)
- The overall plan does however, face a number of key challenges that raise concerns, from our perspective:
  - We suspect that obtaining initial health plan agreements will be quite a difficult hurdle to overcome (because plans must agree to both release data *and* accept CalRHIO fees at prescribed levels) and we are concerned that current grant funding may not be sufficient to allow enough time to get these agreements executed
  - Health plans have expressed concerns over the magnitude ($25 - emergency department and $10 - primary care setting) of the transactions fees proposed by CalRHIO, relative to current fees for Lab and Rx data clearing houses which tend to run well under $1
  - Interviews with CalPERS health plan partners have revealed general concerns and uncertainty over the current direction of CalRHIO, the initial value received from grant money that was supplied, and its prospects for success
  - The scale and quality of available administrative data in the California market is uncertain, given the continued prevalence of capitated payment arrangements, the increasing frequency of prescription drug carve-out arrangements and the general absence of Lab values

- Of the 15 operating RHIOs across the US, only 5 exchange health plan claims information (hospital and lab information is the most commonly exchanged data and claims-based data has not yet proven to be a key tool in successful RHIOs, largely due to the fact that it contains limited clinical information that is useful in care decisions)
- Although Delaware is often cited as a Medicity RHIO success, Delaware is a much smaller and less complex healthcare system than California (despite its smaller scale, it took approximately 4 years for the Delaware effort to develop the necessary business arrangements to begin building RHIO infrastructure)
- The key data elements in the initial phase of the system are Lab values and Rx data, the majority of which will need to come from separate sources, other than the health plans, which are not currently linked to CalRHIO funding triggers
- The overwhelming scale of the CalRHIO effort is larger than any other previously attempted and raises concerns as to whether or not its planned statewide geography is an unworkable scale for a RHIO (a number of other RHIO efforts have failed in much smaller geographies)
- The ultimate value of HIE systems lies in their ability to connect clinical electronic data feeds and this does not occur until Phase II of the CalRHIO development plan some 7 or so years out -- maintaining market interest and support in the interim will be a major challenge

Conclusions

The RHIO movement is driven by interest in the promise of reduced medical claims costs and error rates resulting from giving medical professionals (both in the emergency and office settings) access to real-time patient clinical data. The ROI on RHIO systems is well-documented in the medical literature and our assessment of the CalRHIO plan suggests that ultimately, it too should be able to allow large payers, such as CalPERS, to realize a return on the fees they would pay into the system. It is important to note, however, that these ROI studies are rooted in theory and are largely not yet proven out with real results from operating RHIOs. There are many execution variables related to RHIOs that could undermine the ultimate ROI that emerges, not the least of which is provider community usage patterns.

The CalRHIO technology platform appears to be technologically sound; however, at this point it is still theoretical because actual development has yet to begin. In addition, the overwhelming geographic scale of the proposed system and the sheer volume and diversity of local systems that would need to connect to it, gives us pause when considering its potential ultimate reliability.

At the root of our concerns, however, is the CalRHIO funding and development plan. At this stage of its development, we still see a number of significant hurdles and issues that cause us to question the likelihood of its ultimate success. The Delaware Health

Information Network serves as an example of a successful RHIO that is using the Medicity system (the same one CalRHIO plans to use). However, CalRHIO's development plans differ from the Delaware effort in several key areas:

- Delaware was a true Public-Private partnership, heavily-funded by the State itself throughout the course of development (in fact it has yet to begin charging access fees despite the fact that it has been in operation for several years)
- While its scale was Statewide, the Delaware geography is much more homogeneous and a vastly smaller scale than California
- From the very outset, the Delaware provider community was intimately involved in the planning and configuration of the system in order to ensure they ultimately embraced and used it.

The RHIO concept is one that CalPERS should endorse and support, to the extent feasible, within the State. To that end, we suggest that CalPERS support the CalRHIO development efforts and continue to monitor its progress, perhaps through quarterly or semi-annual briefings to the Health Benefits Committee. At this time, however, we believe there are still too many uncertainties and issues related to the CalRHIO development plan for CalPERS to instruct its health plans to accept fees on its business or to push them to sign agreements with CalRHIO for their entire books-of-business.

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Financial Impact

Data Points and Considerations

Mercer conducted a basic modeling of the overall financial feasibility of CalRHIO and then applied these findings to the potential return for CalPERS if they were to choose to engage with CalRHIO. Overall, the theoretical return on investment from RHIOs is pretty well-documented in a variety of literature sources. However, true examples of RHIO financial success are rare. Therefore, drawing upon the literature and other RHIO examples, Mercer calculated the financial feasibility of the CalRHIO model.

Given the minimal information concerning successful RHIO financial models and their impact on claims costs in addition to the overall lack of successful operating RHIOs, Mercer's findings must be taken as estimates that should be considered in context with all of this report's findings. We relied upon national and California healthcare statistics.

Cost Modeling

Analysis Basis

This section utilizes benchmark statistical information from the National Center for Health Statistics and CalPERS data, including:

- Number of office visits per person per year: 3.31
- Percent of office visits made to a PCP: 50.4%
- Number of emergency department (ED) visits per person, per year: 0.40
- Percent of CalPERS beneficiaries who are Kaiser Permanente members: 38.9%

Kaiser members have been removed from the estimated calculations because CalRHIO has not identified Kaiser claims data as one of their potential data sources and Kaiser has developed its own internal electronic medical record system.

This section also applies the current CalRHIO proposed transaction fees for system access, which are $25 per query in the ED, and $10 per query at a clinic or practice. These estimates assume that the CalRHIO utilization fees will remain at their current levels and that all healthcare providers across California have adopted and access the CalRHIO system 100% of the time.

High Estimate: Cost Modeling

This estimate utilizes the assumption that 100% of ED visits and 100% of office visits by CalPERS beneficiaries would trigger the use of the CalRHIO system and therefore incur the CalRHIO usage fees. Overall, this model creates an upper bound of reimbursement per CalPERS beneficiary of $43 per person per year or $30.0 million per year. Our interpretation of the CalRHIO timeline suggests that 0% of this cost ($0.0 million) would be incurred in year 1, 23% by year 2 ($7.0 million), with the ultimate level being attained by years 3-4.

Best Guess Estimate: Cost Modeling

The above cost model provides the theoretical highest bound of costs that could be incurred by CalPERS on a per person basis. However, it is unreasonable to assume that 100% of office and ED visits would necessitate the use of CalRHIO services. Therefore only illness-related ED visits are assumed to trigger usage of the CalRHIO services. The following assumptions are used:

- 25% of ambulatory office visits trigger the use of CalRHIO services – 0.83 CalRHIO queries per person per year
- Illness-related ED visits trigger the use of CalRHIO services – 0.14 CalRHIO queries per person per year

These inputs create an estimated cost of $12 per person per year or $8.4 million per year. Our interpretation of the CalRHIO development timeline suggests that 0% of this cost ($0.0 million) would be incurred in year 1, 23% by year 2 ($2.0 million), with spending reaching $8.4 million by years 3-4.

If, in actual practice, CalRHIO services are used redundantly, due to conservative medical practices or simply because the services become routine, then it is entirely possible that our best guess estimate of costs could be materially understated. If this were to occur, then the CalPERS program would incur substantially higher costs for marginal added value.

Return on Investment Modeling

With the estimated per person cost per year established, the potential ROI for CalPERS can now be calculated. However, four major unknowns still exist:

- Will the CalRHIO actually operate as envisioned?
- Will the CalRHIO's actual pace of development match the planned timeframe for system rollout and data availability?
- What will be the extent and pace of end-user (healthcare provider) adoption of CalRHIO
- Will CalRHIO ultimately achieve an estimated impact on future claims costs comparable to those portrayed in the literature?

With respect to the first three unknowns, this model will look to the CalRHIO business plan, making the assumption that CalRHIO will deliver the representations made therein. Regarding the represented processes, this model will relate the representations in the CalRHIO business plan to the very limited financial estimates available in the literature.

Literature Background

A handful of studies have attempted to quantify the savings of an optimally constructed HIE. One such study[1] developed savings estimates that depend upon the depth of the HIE. Here is a hierarchical enumeration of the strata of HIE levels:

- Level 1 – Telephone and mail communications (status quo)
- Level 2 – Machine transportable (fax)
- Level 3 – Machine-organizable data (e-mail and electronic messaging)
- Level 4 – Machine-interpretable data (interoperable data exchange with standardized messages and formats)

The study's conclusions suggest that the achievable savings, by moving from Level 1 to Level 4 are approximately 5% of health care costs, subject to the following:

- Standardized information exchange is required. Absence of standardized information exchange effectively moves the HIE to Level 3, and eliminates approximately two-thirds of the Level 4 savings.

[1] Center for Information Technology Leadership, The Value of Healthcare Information Exchange and Interoperability. Healthcare Information and Management Systems Society. (2004)

- The 5% savings level is an ultimate level that exists after ten years of development of the HIE. Over the ten-year rollout and development period, the fraction of this ultimate savings level increases continuously from 1/10 in year 1 to 7/10 in year 5 to ultimate in year 10.
- The study contemplated a national HIE.
- The study identified other, non-financial values that arise from the HIE: clinical values (i.e., care advances and improved patient outcomes) and organizational values (i.e., risk mitigation and stakeholder satisfaction).
- The study cited its own limitations. It mentioned that there was very little experience from which its estimates were obtained and that estimates from experts and a small number of studies were used to create its financial model.

In 2006, the CalPERS health plan expenditures (exclusive of Kaiser) exceeded $2.5 billion. With the passage of time, the 2008 level of expenditures should be in the $3 billion range. Using this number to convert savings levels, the Level 4 savings would be approximately $150 million in 2008 dollars, while the Level 3 savings levels would be approximately $50 million in current dollars.

However, it is important to note that this estimate is speculative at best. Additional factors, including the required level of data interoperability to achieve full ROI from a RHIO investment, cause Mercer to believe that it is unrealistic to anticipate better than Level 3 savings. Mercer's finding is reinforced by many experts who agree that a universal healthcare data standard required for Level 4 is at least 10 years away, and that these developments are largely outside of CalRHIO's control. Mercer's estimate is that CalRHIO will ultimately be able to deliver at Level 3 and that it will evolve to Level 3 at the pace suggested in the second bullet above, with a one-year time lag to take into account the timing of CalRHIO.

Other Potential Sources of Healthcare Savings

Another study[2] by Mark Frisse, MD of Tennessee's MidSouth RHIO suggests that significant savings can be realized from a regional health information exchange if used at point of care in the emergency department. The percentage level of savings cannot be directly obtained because the number of people in the region was not provided. However, the ultimate savings level (net of the cost to implement the program), estimated to be obtained by the fifth year, and is about $5.5 million on a base of 460,000 emergency department visits (or $12 per patient per visit). The use of the HIE was assumed in 90% of the visits by the fifth year. In addition to

[2] Frisse MH, Holmes RL. Estimated financial savings associated with health information exchange and ambulatory care referral. *Journal of Biomedical Informatics*. (2007), doi: 10.1016/j.jbl.2007.08.004

the estimated financial savings, an anticipated improvement in the quality of care was indicated as the most critical gain from the HIE.

However, of note, this study modeled further savings beyond the implementation of the RHIO. The study's authors model an additional utility that would use the RHIOs information to curb wanton ED usage and also aid in redirection of appropriate patients from the ED to ambulatory care clinics. In that community, the average ED visit cost is $275, while ambulatory visits cost $54, which represents significant healthcare savings and decreased burden on the ED.

With respect to California, an October 2006 report by the California HealthCare Foundation[3] found that approximately 46% of all ED respondents believed that their health issues could have also been handled in an out-patient setting. Additionally, during any given year 15% of all California residents visit an ED and 2% have visited 3 or more times (comprising 35% of all ED visits). The savings could be substantial across the state, however the creation of such a system to monitor conditions and ED usage is outside the current scope of CalRHIO and will not be included in the overall modeling. This information is placed here as an example of alternative savings models proposed by other RHIOs.

Conclusions

What these studies suggest is that the advent of an HIE has the potential for substantial savings that will phase in over a term of five to ten years. The following table provides our best guess estimate of the expected costs versus the Level 3 savings derived above:

Stage of RHIO Development	Estimated Costs	Estimated Savings	Resulting ROI
Year 1	$0.0	$0.0	None
Year 6	$8.4 million	$34.0 million	4 to 1
Year 10	$8.4 million	$50.0 million	6 to 1

[3] California HealthCare Foundation, Overuse of Emergency Departments Among Insured Californians. http://www.chcf.org/topics/download.cfm?filePath=http%3A%2F%2Fwww%2Echcf%2Eorg%2Fdocuments%2F%2E%2Fhospitals%2FEDOveruse%2Epdf 2007, p. 10.

Even if the savings level is but one-half of the amounts shown, it would still represent a financial gain for the CalPERS program, provided the financial gains of the RHIO inure to the CalPERS health plans in the form of lower health care costs.

While this section of the report has attempted to provide an assessment of the downstream financial possibilities of a RHIO, please keep in mind that the estimates have been made without the benefit of substantial relevant experience. Also, the following factors will play a key role in the realization of any cost savings:

- The completeness and interoperability of CalRHIO's system
- CalRHIOs actual timeframe for system rollout and data availability
- End-user (healthcare provider) adoption of CalRHIO

3

Technology Platform

It is important to note that the CalRHIO system has not yet been built -- it is currently in the planning stages. Therefore, this analysis discusses what is being planned for the CalRHIO system. Of note, this technology review is quite extensive and detailed and intended for a slightly more technical audience. The conclusion portion of this section contains more concise summary of the overall qualities of the CalRHIO (Medicity) system.

CalRHIO's Challenges

CalRHIO's charter is to position itself as a hub for health information exchange amongst all participants in California's healthcare delivery system. The very nature of this enormous task presents several very large challenges from a technology perspective. The system must:

- Be highly scalable to handle the records of millions of lives and interact with all participants in the health delivery system
- Be highly reliable since health care information may be required in critical care situations
- Possess a high level of data security
- Seamlessly interface with thousands of other systems
- Be easy to use

To meet these challenges, CalRHIO has selected two key partners: Medicity and Perot Systems. Together they will provide the HIE application, and has done so in other cases, most notably for the Delaware Health Information Network (DHIN). Perot systems will provide the hardware, hosting and network infrastructure for the CalRHIO system.

Architecture, Scalability and Availability

The planned architecture for the CalRHIO system is highly scalable. The CalRHIO HIE will act as a hub in a distributed data model to access real-time data as needed. Other sources of data that cannot be accessed in real time will be fed into an edge server at the data source's site in batch fashion. The frequency of the updates to these edge servers will depend on the source. Of note, if the data provider is not comfortable hosting such a server or providing access to their source systems, Perot Systems will host and maintain the edge servers for those data providers.

To ensure maximum interoperability with the numerous data sources, Medicity has not set a standard interface for their system. Rather, they are working with each source to determine the best way to integrate and pull the relevant data. This method is expensive for Medicity, however, it provides maximum flexibility and an easier path to integration for the data source.

All CalRHIO hardware will be hosted by Perot systems in their Plano Texas data center. This data center is equipped with all of the features that one expects in a modern data center. (e.g.; fire suppression, power backup, etc.) The facility has surplus bandwidth capacity that can be added to the CalRHIO system as needed. The current plan for initial deployment is to handle 50% of the population of California. Medicity has created a calculator to help them estimate the amount of data and transactions this entails.

The hardware and software Medicity plans to use is industry standard, well known and proven. The servers are Intel based running Windows 2003 release 2. The database is Microsoft SQL Server 2005. The HTTP server is IIS. ASP.NET is used for the application itself. SSL accelerators are either Cisco or F5. All hardware tiers are redundant so that a hardware failure does not bring the system down. Using standard components will make the system easier to maintain and repair. It also makes it easy to find engineering talent to maintain the system.

Final requirements for system uptime have not been set, and will be a contractual issue between CalRHIO and Perot. However, Medicity expects the SLA to state 99.9% availability. (i.e. less than 9 hours of down time per year.) The architecture of the system will support this goal. However, excellence in operations is also required to achieve "three nines" of uptime. Partnering with Perot Systems for the hosting should allow Medicity to achieve its' uptime goal since Perot has years of operational experience and multiple disaster recovery sites located around the country.

Analysis of the CalRHIO Data Model

The data model is a federated model, which has pros and cons. Such a model introduces many potential points of failure. However, if there is a failure at one point, only the data maintained by that one source will be affected. All the other sources of data will be available.

Medicity is planning to use a code base for the CalRHIO system that is already operating in a production capacity in the DHIN. The DHIN has been in production mode since April of 2007. Medicity does not anticipate any major changes to the code base will be necessary for the CalRHIO implementation. The system has many built in configuration options which reduce the need for changes to the code. Most of the configuration of the system centers around connecting to the given data source, which is to be expected. All of this bodes well for the CalRHIO implementation being stable and reliable.

Integration

Due to the nature of the problem that CalRHIO is attempting to solve, there will potentially be a very large number of connection points for the various data sources and users of the CalRHIO system. Integrating all of these sources was a key consideration in selecting Medicity as a development partner. Medicity is minimizing the risk in this area in multiple ways.

For the source of the data (e.g.; payers, labs, hospital systems, etc.), Medicity works with each source individually to come up with a solution that works well given the source's individual data system. Medicity can connect and perform data pulls in real time via a Web service, or they can accept batch feeds in a format and time schedule that is agreeable to the data source.

The system will meet all Federal and state regulations when it goes live. It will also be compliant with a number of standards initiatives, as members of CalRHIO and Medicity sit on several standards boards.

For consumers of the data, Medicity has been equally flexible. For clinicians who already have an EHR system, Medicity provides plug-ins so that the provider can view the data from the RHIO in a seamless fashion. Medicity currently integrates with 20+ clinical systems and continues to develop plug-ins for the major and some minor EHR systems as the need arises. Providers without an

EHR have multiple options for receiving information. They can use a secure Web based “inbox” to receive the requested information. Additionally, information can be sent via fax or a networked printer to a provider if necessary.

According to two reference interviews, Medicity earned high praise for its ability to integrate their system with the source data. The interviewees attributed this to both Medicity’s technological approach and the expertise of their staff with the overall integration process. Both of these interviewees ranked Medicity’s integration ability as their strongest asset among many strong areas. CalRHIO has expressed the flexibility and adaptability of the Medicity system as a key reason for choosing their solution.

Security

Security is implemented on multiple levels for the planned CalRHIO system. Physically, the hosting facility employs biometric scanners to control physical access. The system is architected in such a way that direct requests from the Internet never hit the servers directly. SSL accelerators, load balanced switches and firewalls are placed in front of the servers, which are in a DMZ, to prevent direct attacks against the servers. Access to servers is denied by default, and only given on a specific basis. There is extensive monitoring on all systems to ensure their integrity.

CalRHIO expects to handle administration of users. User rights can be delegated to multiple users, who gain access through a portal site. This is a key feature given the potentially large number of system users. The security is role based and very fine grained to control which pieces of data users have access to. Individuals can choose to block given providers from accessing their record, if they so choose. Staff members of providers can be delegated access on behalf of the provider. Individual staff members can be a delegate for multiple providers within a practice or facility.

When a provider attempts to access patient information, if the system does not have a record of patient consent, the system will prevent access and present the provider with a consent form that can be printed and signed by the patient. The signed form is kept on file at the provider office and a record that the consent form was signed and the physical location of the form will be entered into the system. CalRHIO plans to perform audits to ensure the forms have been signed and are being retained. The consent form has provisions to allow access to only a portion of the data. The system keeps a detailed audit trail of each piece of information and who accessed it when.

The system will also allow a provider to access a patient's information without consent via a "break the glass" policy for use in emergency situations when a patient may not be able to give consent (e.g. in the ED setting where the patient may be unconscious). To access information via the "break the glass" method, healthcare providers must enter a valid reason into the system. CalRHIO will work with Medicity to determine the specific procedures and guidelines for their "break the glass" policy.

Ease of Use

When a provider queries the system, the provider will be presented with a screen showing them the various records that are available. The provider can then pick and choose the information they are interested in. There are multiple ways to pull the data; all claims for an encounter, all lab visits for a period of time, all inpatient records, etc. A single query can pull back information from multiple sources.

CalRHIO will use the Federal definition, specifically Medicare guidelines, to determine what period of time can elapse for multiple queries to be considered a single query for billing purposes. CalRHIO's contracts will also have a definition for how complete a record must be in order to consider the query successful.

Users of the system will only need a standard Web browser, the Adobe Acrobat Reader and an Internet connection to utilize the system. The Internet connection can be dial up or high speed. The site was designed so that it could function over dial up, although high speed is preferred. Very little client side code is used by the application.

The system contains an online help component that is context sensitive. A call center is available for help 24x7. From the call center, help desk personnel can take over the user's computer to assist in trouble shooting.

In one of this report's reference interviews, the Delaware Heath Information Network contact stated that its users continually report the system as being very friendly to use. This ease of use was a major factor in DHIN's selection of Medicity as its technology partner.

Conclusions

From a technology perspective, the system that CalRHIO has planned should meet the numerous challenges it faces. The system should be scalable, secure and easy to use. From reference checks, the Medicity system appears to be highly reliable and employs significant security precautions. Perhaps most importantly, Medicity earns very high marks for its ability to integrate with disparate systems and to do so quickly and efficiently. Given the number of interfaces and systems that a RHIO must integrate with, this is a significant quality for Medicity. Additionally, Medicity also garners high praise for the ease of use of their user interface and end-user solution.

Reliable systems require excellent planning, implementation and operation. Therefore, it is recommended that CalPERS re-evaluate the implementation and operation of the CalRHIO system when it is fully operational – this would be true of any system. Overall, Medicity and Perot Systems garner high marks and excellent references.

4

CalRHIO Development Plan

Since the inception of the RHIO movement, RHIOs as a whole have struggled with creating a valuable service that produces significant financial savings for all involved. On the surface RHIOs seem to be a key component in combating both healthcare costs and errors – these are key to understanding why the RHIO movement has gained so much momentum over the past several years, despite few success stories.

When examined closer, many RHIO business models do not result in the high value propositions they were once thought to have. That is not to say that RHIOs do not have any value – there may be significant clinical benefits despite the potential of a break-even business proposition. Most of these areas are truly not explored because there have not yet been enough successful RHIOs upon which to perform the studies.

This section will analyze several key areas of the CalRHIO approach and help synthesize an understanding and evaluation of the prospects of CalRHIOs potential for success.

Business Approach

CalRHIO is a collaborative, statewide initiative that seeks to provide a robust, scalable Health Information Exchange utility service to facilitate the inter-organizational and intra-organizational sharing of clinical information.

The project consists of two phases of technical development with a targeted completion date of 2014. More near term goals of exchanging information needed in emergency departments and outpatient clinics and practices are expected to begin in 2009. Two

rounds of financing have been arranged – the first round of $30 million will be triggered upon CalRHIO's successful agreement with 3 health plans to allow CalRHIO access to their book-of-business claims data and to accept CalRHIO transaction fees. The second round of $300 million is scheduled for disbursement to CalRHIO upon the successful completion of phase 1 of technical development.

Phase 1

Phase 1 is designed to create a patient data resource for physicians in emergency departments, clinics and practices. It is envisioned that the sources of this data for Phase 1 development will be claims data from the 6 large health plans in the state (Aetna, Blue Cross, Blue Shield, Cigna, HealthNet and United), laboratory results from LabCorp and Quest, and pharmacy data from RxHub and SureScripts. This phase will consist of the creation of a health information exchange that provides statewide access to claims data, California-based laboratory results and data from pharmacy companies.

In addition to the integration of these data sources into the CalRHIO system, other important technical components of the CalRHIO system will be built. These system components will comprise the technical "backbone" of CalRHIO: a Master Patient Index (MPI – keeps track of the patients in the system) and a Record Locator Service (RLS – keeps track of which patients were seen where, i.e. where their data is located). These two components of the RHIO will coordinate the disparate patient information made available from the many local data providers across the RHIO, and will enable healthcare providers to query the CalRHIO data.

No central data repository will be created; rather all data will reside on source systems or in edge servers at the data provider's site. It is estimated that the system will be ready for physician use 12 months after the initiation of Phase 1. However, not all insurance provider/claims-based data will be available at the end of year one – as additional data providers sign-on to the CalRHIO system, their data sources will be integrated. The timeline for full completion of Phase 1 is four years.

Phase 1 - Challenges and Concerns

Through our interview process, some of the potential data providers (i.e. insurance providers), expressed very strong concerns with CalRHIO and stated that they have no current agreements to provide data to CalRHIO. Yet, CalRHIO needs at least 3 of the 6 key payer data providers to sign fee and data agreements with the network to trigger their first round of funding. It remains unclear when or even if payers will sign these agreements. This uncertainty is significant as the CalRHIO's 7-year development timeline does not begin until the agreements are in place.

Some of the insurance companies' reluctance can be attributed to the dual-requirements for CalRHIO participation. The first requirement is that the insurance companies provide data to the RHIO – given their interview responses, it remains unclear that insurance companies will want to release their books-of-business to CalRHIO. The second requirement is that the insurance companies agree to pay the RHIO transaction fees. This essentially means that the insurance companies have to commit to the fee structure before they even provide data. Several companies expressed concern over these requirements. Of note, in other successful RHIOs, insurance/payers are not major data contributors – in the CalRHIO effort they are seen as the keystone data providers. No precedent exists of a successful RHIO relying on payers to be their data "keystone."

Even if CalRHIO could sign agreements with 3 of the 6 insurance plans, it remains likely that if only 3 data sources are used (or any combination of limited data) the overall RHIO data pool would be limited such that users (physicians, nurses, etc) may not find CalRHIO's service attractive or sufficiently useful. This would greatly impair user adoption and would therefore also limit the overall value proposition of the RHIO. Additionally, no guarantee exists as to the completeness of the insurance provider's claims data given that California has a high prevalence of capitated payment arrangements, an increasing frequency of prescription drug carve-out arrangements and the general absence of lab values in claims data. Overall, these factors raise concerns that the user value proposition might not be sufficient to drive early and overall adoption, which would also diminish the longer-term ROI for the RHIO.

Two other types of data providers will complete CalRHIO's data for Phase 1 of development – lab companies and pharmacy data aggregators. CalRHIO plans to purchase data from the pharmacy data aggregators and build those costs into the CalRHIO transaction fees. As CalRHIO will have to purchase data from the pharmacy data aggregators (most is data that is already made available by these aggregators), that business agreement is fairly straightforward.

However, the business arrangements necessary for lab company participation will be more difficult to accomplish. Traditionally, lab companies have viewed their data providing modalities as a strategic business advantage. Some lab companies utilize as many data channels as possible, while other lab companies make a majority of their electronic data available mainly or exclusively through their own proprietary web portals. These companies hesitate to enter into data sharing agreements that might erode their competitive edge as a data supplier. This concern could lead to significant challenges for CalRHIO in negotiating data provision agreements with the lab data providers.

Phase 2

Phase 2 development is estimated to commence 15 months after the launch of Phase 1. The overall goal of Phase 2 development is to integrate with Electronic Health Records (EHR) systems at hospitals and clinic/practices across California. This process is much more labor intensive than Phase 1, and according to CalRHIO estimates, the completed system will integrate with over 7,000 different hospital and clinical databases.

Phase 2 will make available patient information from hospitals and clinics, including radiology reports, pathology reports and images. Additionally, CalRHIO may include the ability to integrate this data from CalRHIO into physician's EHR systems (this capability may not be complete by the 2014 deadline).

It is important to note that the approximately 7,000 integrations slated for Phase 2 development are largely contingent upon CalRHIO's successful legal negotiations with hospitals and clinics. As data sources agree to join the CalRHIO system, their data and information will be added into the CalRHIO system. In other words, hospitals and clinics will be added as data sources individually and over time. Overall, CalRHIO estimates that this process will take at least 5.75 years, with a completion date around 2014. CalRHIO estimates that at that time, approximately 90% of all Californians' health records will be made available through the system.

Phase 2 - Challenges and Concerns

The size and diversity of the California healthcare system leads us to concerns about the overall feasibility of the CalRHIO plan and approach. The geographic scale of California is so great, that the integration effort alone with 7,000 source systems is daunting. However, prior to those integration efforts, CalRHIO will need to negotiate data sharing agreements with those 7,000 different entities – a highly difficult task. This was one of the main issues with the Santa Barbara experience[4] - the legal wrangling over data provision agreements led to delays and contributed to the failure of the system to become operational. While CalRHIO has undoubtedly learned from this experience, getting 7,000 data providers to agree to the same data provider agreement remains a highly difficult task.

One of Medicity's success stories is the Delaware Health Information Network, or DHIN. Medicity is rightfully proud of that effort as it has been successful for the state of Delaware thus far. However several large differences exist between Delaware and California.

[4] Miller RH, Miller BS. The Santa Barbara County Care Data Exchange: what happened?. *Health Affairs*. 2007 Sep-Oct;26(5):w568-80. Epub 2007 Aug 1.

First, the state of Delaware gave the DHIN $1 million to become established and the state passed a charter, essentially giving the state's blessing to the DHIN effort. California has not, as of yet, made such a supportive move of CalRHIO. While this $1 million grant seems much less than the $3.7 million that CalRHIO has raised to date, the $1 million figure dwarfs the CalRHIO fundraising when you consider that the population of the entire state of Delaware is approximately 840,000, or roughly the same population as San Francisco. Also, the number and diversity of potential data providers in Delaware pale in comparison to the numbers and diversity of California.

The DHIN example should be taken as an example of a successful Medicity implementation, and less as a lesson as to the benefits/successes of RHIOs, particularly because of the intricacies and complexities of the California healthcare system. Given the sheer size and complexity of the California healthcare environment, Phase 2 Development (and Phase 1 Development) will pose significant challenges to CalRHIO and its plans to continue forward with RHIO development.

Funding and Finance Strategy

To date, CalRHIO has relied exclusively on grant funding from entities such as Blue Cross of California, Sutter Health, Kaiser Permanente, and the California HealthCare Foundation. However, CalRHIO's long term financing approach consists of two rounds of financing, each with specific tranches of funding leading toward a fully sustainable model. Both Round 1 and Round 2 funding sources have been coordinated and have triggers specific to technical development milestones.

Round 1: Initial Funding

Round 1 funding consists of $30 million from "groups experienced in risk capital investments." This round of funding has been organized and will trigger as soon as at least 3 health plans to sign CalRHIO's data and fee agreement. These funds will be expected to last through the completion of Phase 1 of the technology development at the end of year 4. This funding is thought to be sufficient to complete Phase 1 of the technical development and initiate Phase 2. Additionally, once Phase 1 is operational, the RHIO will begin to generate additional revenue from transaction fees, which will also support the technical development.

Round 2: Continued Development

Round 2 funding will commence upon successful completion of Phase 1 of the technology development, which is estimated to occur at the end of year 4. These funds are expected to be composed of tax-exempt funding, i.e. bond financing. This approach will allow CalRHIO to continue operating as a non-profit utility for the California healthcare community and complete integration with local/regional EHR systems such that 90% of all Californians will have a record in the system.

The long-term sustainable funding model for CalRHIO consists of transaction fees charged to claims payers for each time a patient's information is queried in the system. Currently, these fees are pegged at $25 per emergency department query and $10 per clinic/practice query. According to CalRHIO, the fees have been set at these levels to not only cover their individual transactional costs, but to also help continue development of the CalRHIO system. These fees, in addition to the larger funding, have been structured (according to CalRHIO) to not burden early adopters with the financial burden of paying for a system that remains a risky investment.

Funding and Financing - Challenges and Concerns

Despite CalRHIO's financial plans, concerns remain about the structure of the financing. The $25/$10 CalRHIO fee structure is intended to cover some of the developmental costs, in addition to operating expenses, and therefore these fees will be paying, in part, for the early development of the system and as a result, place a disproportionate financial burden on early data providers and their customers. In essence, while those early data providers are not directly contributing a large upfront financial investment toward development, they will be funding the repayment of CalRHIO financing used for development costs.

While a RHIO could make simplify some aspects of data gathering for them, many insurance companies are used to data transactional fees that are below $1 per transaction. The proposed CalRHIO fees of either $25 or $10 are significantly above the amount normally paid by insurance companies and will cause them concerns about their ability to pass them through to customers in their pricing. Therefore, it remains unclear whether health plans will accept the magnitude of these fees.

With respect to the coding and billing, medical claims are classified by what are known as CPT codes. Claims payment systems are programmed to look for valid CPT codes when processing claims (particularly electronically). Yet, at the current time no specific CPT code exists for the look-up or review of electronic patient information (basically the transaction fees that CalRHIO wants to pass to claims payers). In order to allow claims payers to process their fees without manual processor intervention, CalRHIO plans to try to

assign their fees to an existing CPT code currently used for a different purpose. There are lots of uncertainties associated with this approach, including whether or not the selected code is currently considered valid by payers, whether or not systems would need to be reprogrammed to accept it and whether or not this will be an acceptable approach (given that the code is currently designated for a different purpose). If CalRHIO ends up having to seek approval for a new CPT code, this process can be long and complicated. Whatever the outcome, any approach to this area that requires claims payers to either design a manual process or reprogram their claims systems, will likely be met with resistance.

Conclusions

From a business development perspective, CalRHIO faces significant hurdles and participation remains a risky proposition for its potential data providers and those who will be paying the CalRHIO transaction fees. While CalRHIO insists that early stage data providers and users will not be footing the bill for development, in reality many of those development costs will actually be funded (or repaid) through the transaction fees for CalRHIO. Participants are very much aware of this, which is reflected in their hesitancy to sign data provider agreements. Additionally, some concern exists that due to the long time frame required for these types of negotiations, CalRHIO may not have sufficient funding to successfully complete these negotiations.

Adding to this concern is the sheer size and diversity of California and its healthcare system. While this does not indicate that such a health information exchange effort should not be attempted, it does add another layer to the complexity of negotiating data provider agreements, gaining traction with users, and in technical development and roll-out. The business needs and requirements of the insurance companies, who are slated to be the primary data providers during Phase 1 of development, vary widely and their concerns are substantial. Providing grant funding to explore an effort such as CalRHIO is significantly different than agreeing to provide data and commit to ongoing transaction fees.

Although the Delaware Health Information Network is cited by Medicity/CalRHIO as a successful implementation of a RHIO, it is important to note that while it is a success, the DHIN serves a vastly smaller and less complex healthcare system. Not to diminish the efforts of the DHIN, but the CalRHIO effort exists on a much larger scale. Of note, the DHIN required approximately 4 years to develop the necessary business agreements to even start building the DHIN's infrastructure.

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